

HISTORY OF MEDICINE

Sounding the Alarm on Climate Change, 1989 and 2019

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“The subject of climatic and environmental changes that result from human activity has been much in the news recently,” Alexander Leaf wrote in the *Journal* 30 years ago.¹ Threatened by acid rain, greenhouse gases, ozone depletion, and global warming, the planet seemed vulnerable. Humans would face “disastrous consequences” as the planet ruptured around them. Leaf was sounding the alarm on climate change and human health: environmental change had become part of the burden of physicians. Now, as the climate crisis continues to unfold, the story of a physician who devoted his attention first to the nuclear threat and then to planetary health offers much-needed inspiration.

Leaf was born Alexander Livshitz in 1920, in Japan, where his parents had fled the Russian Revolution. After migrating to the United States, he studied chemistry at the University of Washington, joined the Army Medical Corps, and completed an accelerated medical degree at the University of Michigan in 1943. After residencies at Massachusetts General Hospital (MGH) and the Mayo Clinic, he returned to Michigan to research electrolyte metabolism, including how bodies responded to hot climates. With support from the Rockefeller Foundation, he established a cell biology laboratory at Harvard Medical School (HMS). In 1966, he became the Jackson Professor of Clinical Medicine at Harvard and chief of medicine at MGH.

Living in the shadow of nuclear war, Leaf helped found Physicians for Social Responsibility (PSR) in 1961 and became a prominent member of International Physicians for the Prevention of Nuclear War (IPPNW). Both groups called on physicians to extend their vision beyond the clinic. As Leaf later wrote in his memoir, “there are social and man-made hazards with possibly disastrous consequences to human health” that were ignored by medical training. To protect human health, physicians had to educate themselves about those hazards and take their stand “in the vanguard.” Physicians in PSR, for instance, saw that there could be no useful medical response to nuclear war. They therefore worked to prevent it, in part by cataloguing the likely human consequences, both physical and psychological, of such “genocidal destructive forces.”² By the early 1980s, PSR had established a significant public presence and won substantial political clout.

In 1981, Leaf became chair of the new Department of Preventive Medicine and Clinical Epidemiology at HMS. Work with the World Health Organization (WHO) had shown him what physicians could achieve by means of education. He was also influenced by evolutionary perspectives on disease and medicine. He cited the work of Johns Hopkins pediatrician Barton Childs, who argued that evolution had left humans ill suited for their modern environment and that physicians should

first focus on environmental and lifestyle factors, turning to medicines or surgery only as a last resort. Leaf’s department explored nutrition, occupational health, environmental health, epidemiology, and prevention of infectious disease. He was disappointed to find that many students preferred to learn “the cold dope” — traditional diagnosis and therapeutics.²

Leaf’s interest in the health effects of nuclear war, which led to contributions to a 1984 WHO report and a 1985 Institute of Medicine symposium, increasingly focused on the consequences for global ecosystems. In 1986, he published an update on the medical consequences of nuclear war, highlighting new research on estimated casualties, the effects of radiation, and post-blast immune dysfunction. A full third of the article examined what looked to be the most deadly consequence of any nuclear war: global starvation. Food reserves would be contaminated or plundered, technologies for harvest, transportation, and refrigeration would fail, and radiation would disrupt ecosystems.³

This ecologic approach to human health led Leaf beyond the nuclear threat. He heard Michael McElroy, at Harvard’s Center for Earth and Planetary Physics, lecture about the threat of global environmental change. He read reports from the Worldwatch Institute. He was inspired by the World Commission on Environment and Development, led by

physician and Norwegian Prime Minister Gro Harlem Brundtland. The commission's 1987 report called for decisive multilateral action to secure the "common future" of the human species. Human activity had already begun to disrupt the planetary systems that support life. Leaf saw that preventive medicine would need to address not only the nuclear threat, but also the environmental degradation taking place globally.

Leaf might also have seen an April 1989 *Lancet* editorial entitled "Health in the Greenhouse." It warned of a global environmental disaster on the order of an AIDS pandemic or a nuclear war — but more certain, since it proceeded from physics rather than politics. There was no time for further research, the editorial argued. Fundamental changes had to be made in transportation, energy, and agriculture to protect the ecosystems on which human survival depended.⁴

Leaf shared his environmental concerns with his close friend Arnold Relman, the *Journal's* editor-in-chief at the time. Relman had warned IPPNW physicians that they should avoid committing themselves to political parties or specific solutions even as they outlined threats to human health. Yet he encouraged Leaf to write up his concerns for publication in the *Journal*.² Leaf's December 1989 article, "Potential Health Effects of Global Climatic and Environmental Changes," suggested that climate change's effects on bodies, minds, and ecosystems would be analogous to those of nuclear war. Physicians had to explore not just environmental science, but also the social, economic,

and political factors that drove environmental change, influenced the distribution of its health effects, and held the key to possible solutions.¹

Leaf's article introduced these problems to a wide readership in medicine and public health and inspired scholarship in many fields. As the Cold War wound down, Leaf and his colleague Eric Chivian, a Harvard psychiatrist, campaigned successfully for PSR to adopt "a broader environmental protection plan."² Harvard continued to be a base for new thinking about health and the environment and is now home to the Planetary Health Alliance, led by physician Samuel Myers.

Over his career, Leaf had turned from one existential threat to another, from the risk of nuclear annihilation to catastrophic effects of global environmental change. He retired in 1990 but never lost sight of the global environment as the context for human health. His 1996 memoir engaged with new research on human health on an ailing planet, showing language and themes similar to those of the work of epidemiologists Anthony McMichael and Andy Haines.⁵ "The ultimate consequence to mankind of such environmental damage," he wrote, "will be deleterious effects to human health." IPPNW had won the Nobel Peace Prize in 1985 for its efforts to educate and advocate, contributions that had helped to cool — though not end — nuclear tensions. Leaf believed that education and advocacy would also prove effective against climate change: if people understood the health threats of environmental degradation, they would "personalize the consequences of these

threats to their own health and survival and demand appropriate controls through government regulations."²

The alarms sounded by Leaf, the Brundtland Commission, and others spurred ongoing research and advocacy. Scientists have produced irrefutable evidence of climate change and environmental degradation. The past decade has seen a rush of new organizations, new journals, and new funding priorities loosely united under the mantle of "planetary health." Their goals align with Leaf's 1989 agenda, calling for reconfiguration of transportation, housing, agriculture, energy, and medicine to sustain the planet's natural systems and the health of humans and other species.

But the climate crisis might prove more intractable than the nuclear threat. Prevention of nuclear war requires sustained commitments by world leaders. Public pressure can be brought to bear directly on them. Prevention — or, at this point, mitigation — of climate change requires fundamental restructuring of all societies. Everyone, not just political leaders, must act. It may no longer be appropriate for physicians to remain apolitical. Leaf's "potential health effects" are now being realized. Many climate-conscious physicians and planetary health researchers call for change through existing political mechanisms. Will such actions go far enough or fast enough? Seeing their warnings go unheeded, activists have turned from research to advocacy to civil disobedience. They promise to sound the alarm on climate change and human health ever more forcefully until our societies are transformed.

Disclosure forms provided by the authors are available at [NEJM.org](https://www.nejm.org).

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Treating Addiction as a Terminal Disease

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“I’ve never been fired before,” the attending physician said when I returned his page for an ethics consultation.

His patient, Ms. A., had a history of opioid use longer than her adulthood and had been through inpatient rehabilitation, methadone maintenance, and buprenorphine treatment programs without lasting success. She’d been admitted to the hospital in septic shock, severely malnourished. An echocardiogram revealed that two valves had been destroyed by the infection. Although this was Ms. A.’s first episode of endocarditis, her condition was too unstable for her to survive surgery. Her distraught family agreed to a do-not-resuscitate order. But despite the dire prognosis, Ms. A.’s condition slowly improved. Just as the cardiothoracic surgeon had agreed to operate, Ms. A. announced that she wanted to be discharged. She did not want surgery. She just wanted more morphine to alleviate her intractable chest pain. When the attending physician, questioning her decisional capacity at that moment, hesitated, Ms. A.’s family fired him.

As I listened to his account, I focused on the obvious questions:

Did Ms. A. have decisional capacity, and if not, who had the legal authority to decide on her behalf? At her bedside, her sibling deferred decision making to his spouse. New York state law strictly governs decision making for incapacitated patients who have not appointed a health care proxy and limits the scope of decisions made by surrogates who are not designated proxies. In such cases, life-sustaining treatment can be withheld or withdrawn only when the patient has an illness expected to cause death within 6 months, regardless of treatment; is permanently unconscious and treatment would be extraordinarily burdensome; or has an irreversible condition for which treatment would be inhumane or extraordinarily burdensome.

Was Ms. A. likely to die within 6 months even with treatment? Though she might well recover from surgery, her long-term outcome was far less certain. Unless her treatment included medication for opioid use disorder (OUD) — preferably initiated in an inpatient setting and coupled with ongoing trauma-informed mental health care and various social supports — she would almost

certainly have a relapse. The hospitalist had offered to facilitate referrals for OUD treatment, but acute care was his priority, and the hospital lacked a substance use team to assist him. Complicating matters, Ms. A. had neither housing nor employment prospects, both of which are key to good outcomes.

Terms like “inhumane” and “burdensome” were subjective, and I questioned how they applied to Ms. A.’s situation. Was continuing to live with addiction “extraordinarily burdensome”? Who has the right to decide when the burden of living with mental illness, including substance use disorders, is excessive? Does it matter whether potentially effective treatments are available if they’re inaccessible or infeasible in the patient’s social situation? Ethicists remain divided over such questions, simultaneously reluctant to infringe on the autonomy of apparently competent adults and concerned about the implications of supporting such decisions for patients with mental disorders.¹

I walked over to the hospital to meet Ms. A., her family, and the medical team. The atmosphere was tense. Ms. A.’s moods swung